

Making Glass From Scratch



Objective

To teach students about the processes and resources used in the manufacture of glass and to introduce how recycling glass is good for the environment.



Activity Description

Students make a glass-like substance using sugar and water.



Materials Needed

- 1 cup sugar
- 1/4 cup water
- Hot plate and sauce pan or hot pot (to boil water)
- 8-inch square sheet of glass or a cookie sheet
- Newspaper
- Assorted glass objects



Key Vocabulary Words

Glass
Heat
Energy
Natural resources
Reuse
Recycle
Resource
Minerals
Raw materials



Duration

45 minutes



Skills Used

Communication
Reading
Observation/classification
Problem solving



Activity

Step 1: Discuss how glass is made (i.e., that sand, soda and lime are heated together at high temperatures), emphasizing the heat and energy required during the manufacturing process. Explain to students that glass containers can be remelted or “recycled” to make new glass containers, saving valuable resources in the process. (Refer to the Teacher Fact Sheets titled *Products* on page 25 and *Recycling* on page 101 for background on the manufacturing process.) During the discussion, allow students to touch a variety of different glass objects (e.g., beverage container, jelly jar, vase). Ask them to describe the colors, shapes, and textures of the different items.

Step 2: Begin the glassmaking exercise by heating the water. Tell students you are going to make “pretend” glass using sugar in place of the actual raw material, sand. Let students examine the sugar and describe it in terms of its color, texture, and shape. Point out the similarities between the sugar and sand. Have students describe the water and how it changes as the heat begins to make the water boil (e.g., after the sugar has melted it will look like a brown liquid). Point out the heat energy involved in making the water boil as well as the steam that is produced. Next, pour the sugar into the boiling water. Tell students to pretend the sugar is sand (minerals) from the ground.



math



science



social studies

Step 3: Stir the mixture vigorously over the heat until the sugar is dissolved (about 5 minutes). Ask students to describe the changes in the sugar and water. Tell them this is how glass looks before it cools.

Step 4: Put several layers of newspaper under a sheet of glass or a cookie sheet. (If you are worried about handling glass, use a cookie sheet—although students will not be able to see through it.) Carefully pour the mixture onto the sheet of glass and allow it to cool (about 15 minutes).

Step 5: Hold up the sheet of “glass” so students can see through it. By allowing it to set overnight, the “glass” will become frosted. The next day, ask students to describe the changes that occurred overnight and why (e.g., the water evaporated leaving sugar crystals behind).

Step 6: As an optional exercise, illustrate glass recycling by scraping the dried “glass” back into the pan (pretending it is small pieces of crushed, recycled glass), adding water, and reboiling the mixture. More sugar will need to be added to repeat the procedure. Ask students which resources were replaced when the crushed glass was used to make the new glass (minerals, energy).



Assessment

1. Ask students what materials are used to make virgin (nonrecycled) and recycled glass bottles. Older students may illustrate the process, labeling the natural resources used to make glass and show which ones are replaced when recycled glass is used as a raw material.
2. Have students describe how recycling glass is good for the environment.



Enrichment

1. Perform a molding glass exercise. For this project, you will need one wide-mouth glass jar per group of four to six students, and one stiff straw or glass tubing, balloon, and rubber band per student. To begin, divide the class into small groups of four to six students and give each group a wide-mouth jar. Next, give each student a straw or glass tubing, balloon, and rubber band. Assist students in attaching the balloon to the straw with the rubber band. Ask students to take turns putting the balloon into the jar and blowing it up until it takes the shape of the jar. Explain that this process illustrates how glass is molded into a jar or other shape during the manufacture of glass containers.
2. Bring samples of handmade glass to class and show students the bubbles in the glass formed by a person blowing air into the hot glass mixture. Point out the irregularities that identify the glass as handmade. Visit a glass blower, if possible. These individuals often participate in local crafts festivals or similar events.
3. Ask students to look around their homes for glass products that could be recycled to make new glass. Ask students to make a list of the items and bring the list to class. Have students share their lists and then discuss which items can and cannot be used for recycling (for example, items not commonly accepted for recycling are lightbulbs, mirrors, windows, etc.).